THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

FINAL EXAMINATION 2006
BACHELOR OF TECHNOLOGY PROGRAM - COMPUTER ENGINEERING

ECX 5240 INFORMATION SYSTEMS 068

Date: 23rd April 2007 **Time: 9.30 – 12.30**

Answer **ONLY FIVE** *questions:*

1 a) Database design process can be divided into three main phases:
(i) Conceptual database design
(ii) Logical database design
(iii) Physical database design
Briefly describe each of these design phases. What are the inputs and outputs of each phase? (9 marks)

b) What are the objectives of database management? (6 marks)

c) What are the facilities provided by a database management system? (5 marks)

2 Consider two transactions on bank accounts A, B and C whose initial balances are Rs.100, Rs.200 and Rs.300 respectively. **Transaction T** transfers Rs.10 from account A to B. **Transaction U** transfers Rs.25 from account C to B. The net effect of executing the transactions T and U should be

* decrease the balance of account A by Rs.10 and account C by Rs.25;
* increase the balance of account B by Rs.35

Assume that the transactions are allowed run concurrently as shown in the figure below.

Transaction T: BankWithDraw(A, 10) BankDeposit(B, 10)	**Transaction U:** BankWithDraw(C, 25) BankDeposit(B, 25)
balance := A.Read .. 100	
A.Write (balance – 10) .. 90	
	balance := C.Read() .. 300
	C.Write(balance – 25) .. 275
balance := B.Read .. 200	
	balance := B.Read() .. 200
	B.Write (balance+25) .. 225
B.Write (balance+10) .. 210	

a) Is the result correct? If not explain what has gone wrong. (5 marks)

b) Give a serially equivalent interleaving of T and U. (9 marks)

c) Briefly explain two concurrency control problems. (6 marks)

3 a) Why is SQL not suitable as a language for developing database application? (4 marks)

b) What can a database application programmer do to overcome limitations of SQL? (6 marks)

c) What are the advantages of using stored procedures? (4 marks)

d) What are triggers? What are the different types of triggers in SQL Server 2000? (6 marks)

4 Consider the following tables to answer the questions asked below. 7

Technician

TechCode	Name	Speciality
E100	A. Perera	Electrical
C102	P. Sarath	Computer
E104	S. Naveen	Electrical
X105	B. Silva	Electronics
C112	K. Saman	Computer

Configuration

ConfCode	Memory	Hard Disk	Multimedia
C2345	256MB	2GB	Yes
C3417	512MB	4GB	No
C5400	512MB	6GB	Yes

Computer

CompCode	TechCode	ConfCode	DateAssembled
OU200	C102	C2345	19/12/02
OU245	C112	C3417	06/04/04
OU789	E100	C2345	20/02/02
OU65	C102	C5400	23/05/02

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a) Give relational algebra expressions for the following queries. (10 marks)

(i) Who is the technician who assembled a computer but not a computer specialist?
(ii)What are the computers that have more than 4GB hard disk?
(iii)Who assembled computers which do not have multimedia in their configurations?

b) Give relational calculus expressions for the queries in (a). (10 marks)

5 a) Give a procedure for recovery using deferred update in a single-user environment. (5 marks)

b) If a transaction fails before completion what can you do to make sure that the reports already generated during the transaction are discarded? (4 marks)

c) What is shadow paging? (5 marks)

d) Differentiate between recovery via reprocessing, and recovery via roll-back/roll-forward. (6 marks)

6 The relation LENDING of a proposed database for a library is given below. Books are issued to registered members only. The names, email-addresses, postal-addresses of the members are recorded in the relation. A book title and its author are uniquely identified by the ISBN number.

Lending(MemberNo, Due-date, Title, Author, ISBNno, MemberFName, MemberLName, eaddress, pAddress)

a) Are there any undesirable features in this relation? (2 marks)

b) How can this relation be normalized (upto BCNF)? (8 marks)

c) Draw determinacy diagrams and identify the candidate keys and primary keys of your answer in part(b). (8 marks)

d) Comment on the operational aspects of the database consisting with the relations obtained in part(b). (2 marks)

7 a) How do warehousing, OLAP, and data mining complement each other? (5 marks)

b) Briefly explain the concepts of competitive forces and the value chain models with one or two real world example(s). (10 marks)

c) Data mining technologies can be used in variety of decision-making contexts in organizations. What are the knowledge discovery areas in data mining? (5 marks)

8 a) What is the database system you used for the mini-project? Does it allow a Database Administrator to define different classes of user, with different levels of updating privileges and different views of the database? (8 marks)

b) What is a database 'View' and why is it a useful concept? (5 marks)

c) What are the types of proactive measures that can be taken to prevent security breaches? (4 marks)

d) Name tree basic levels of management of security associated with Information systems. (3 marks)